

Advances in the Synthesis of Isatins: A Survey of the Last Decade

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Abstract

© 2018 Georg Thieme Verlag Stuttgart. New York. Isatin derivatives are widely used in organic synthesis, in medicinal chemistry and in the chemistry of materials. This report summarizes modern trends in the synthesis of substituted indolin-2,3-diones covering the literature from 2007 to 2017. Studies on the influence of the structure of substituents in the initial substrates on the formation of the heterocyclic isatin system and the yields of the target compounds are also discussed. 1 Introduction 2 Oxidation of Indole Derivatives 3 Cyclization of o - Aminoacetophenones 4 Cyclization of N -Acylanilines 5 Miscellaneous 6 Conclusion.

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Keywords

C-C bond formation, catalysis, heterocyclization, indoles, isatins

References

- [1] Singh G. S. Desta Z. Y. Chem. Rev.: 2012; 112 6104
- [2] Moradi R. Ziarani G. M. Lashgari N. ARKIVOC: 2017; 148
- [3] Bogdanov A. V. Musin L. I. Mironov V. F. ARKIVOC: 2015; (vi): 362
- [4] Bogdanov A. V. Mironov V. F. Chem. Heterocycl. Compd.: 2016; 52 90
- [5] Bogdanov A. V. Mironov V. F. Musin L. I. Musin R. Z. Synthesis: 2010; 3268
- [6] Bogdanov A. V. Yusupova G. G. Romanova I. P. Latypov S. K. Krivolapov D. B. Mironov V. F. Sinyashin O. G. Synthesis: 2013; 45 668
- [7] Xu Z. Zhang S. Gao C. Fan J. Zhao F. Lv Z.-S. Feng L.-S. Chin. Chem. Lett.: 2017; 28 159
- [8] Sandmeyer T. Helv. Chim. Acta: 1919; 2 234
- [9] Stolle R. Bergdoll R. Luther M. Auerhahn A. Wacker W. J. Prakt. Chem.: 1930; 128 1
- [10] Gassman P. G. Cue B. W. Jr. Luh T. Y. J. Org. Chem.: 1977; 42 1344
- [11] Guyot A. Martinet J. Compt. Rend.: 1913; 166 1625
- [12] Tohma H. Kita Y. Adv. Synth. Catal.: 2004; 346 111
- [13] Zhdankin V. V. Curr. Org. Synth.: 2005; 2 121
- [14] Ladziata U. Zhdankin V. V. ARKIVOC: 2006; (ix): 26
- [15] Satam V. Harad A. Rajule R. Pati H. Tetrahedron: 2010; 66 7659
- [16] Duschek A. Kirsch S. F. Angew. Chem. Int. Ed.: 2011; 50 1524
- [17] Zhdankin V. V. J. Org. Chem.: 2011; 76 1185
- [18] Yadav J. S. Subba Reddy B. V. Suresh Reddy C. Krishna A. D. Synthesis: 2007; 693
- [19] Yadav J. S. Subba Reddy B. V. Suresh Reddy C. Krishna A. D. Tetrahedron Lett.: 2007; 48 2029
- [20] Bredenkamp A. Mohr F. Kirsch S. F. Synthesis: 2015; 47 1937

- [21] Bindu V. H. Parvathaneni S. P. Rao V. J. *Catal. Lett.*: 2017; 147 1434
- [22] Zi Y. Cai Z.-J. Wang S.-Y. Ji S.-J. *Org. Lett.*: 2014; 16 3094
- [23] Liu P. Guo J. Wei W. Liu X. Sun P. *Eur. J. Org. Chem.*: 2016; 12 2105
- [24] Wang C.-P. Jiang G.-F. *Tetrahedron Lett.*: 2017; 58 1747
- [25] Luo J. Zhao Y. Xu X. Zheng J. Liang H. *Tetrahedron Lett.*: 2017; 58 4591
- [26] Szabo F. Petho B. Gonda Z. Novak Z. *RSC Adv.*: 2013; 3 4903
- [27] Chen S. Liu Z. Shi E. Chen L. Wei W. Li H. Cheng Y. Wan X. *Org. Lett.*: 2011; 13 2274
- [28] Basavaraju K. C. Sharma S. Singh A. K. Im D. J. Kim D.-P. *ChemSusChem*: 2014; 7 1864
- [29] Liu X. Chen W. *Organometallics*: 2012; 31 6614
- [30] Zhang C. Li S. Bures F. Lee R. Ye X. Jiang Z. *ACS Catal.*: 2016; 6 6853
- [31] Muneer M. Saquib M. Qamar M. Bahnmann D. *Res. Chem. Intermed.*: 2010; 36 121
- [32] Piancatelli G. Scettri A. D'Auria M. *Synthesis*: 1982; 245
- [33] Kumar C. N. S. S. P. Devi C. L. Rao V. J. Palaniappan S. *Synlett*: 2008; 2023
- [34] Sriram R. Kumar C. N. S. S. P. Raghunandan N. Ramesh V. Sarangapani M. Rao V. J. *Synth. Commun.*: 2012; 42 3419
- [35] Pedras M. S. C. Abdoli A. *Bioorg. Med. Chem.*: 2017; 25 557
- [36] Yu J.-W. Mao S. Wang Y.-Q. *Tetrahedron Lett.*: 2015; 56 1575
- [37] Wang B. Zhu J. Wei Y. Luo G. Qu H. Liu L.-X. *Synth. Commun.*: 2015; 45 2841
- [38] Parvathaneni S. P. Bikshapathi R. Rao V. J. *Tetrahedron Lett.*: 2015; 56 6385
- [39] Wei W.-T. Ying W.-W. Zhu W.-M. Wu Y. Huang Y.-L. Cao Y.-Q. Wang Y.-N. Liang H. *Synlett*: 2017; 28 2307
- [40] Wang H. Wang Z. Huang H. Tan J. Xu K. *Org. Lett.*: 2016; 18 5680
- [41] Bergman J. Romero I. J. *Heterocycl. Chem.*: 2010; 47 1215
- [42] *Transition Metals for Organic Synthesis: Building Blocks and Fine Chemicals*. 2nd ed.; Beller M. Bolm C. Wiley-VCH Weinheim: 2004; 2
- [43] Du F.-T. Ji J.-X. *Chem. Sci.*: 2012; 3 460
- [44] Evans R. W. Zbieg J. R. Zhu S. Li W. MacMillan D. W. C. *J. Am. Chem. Soc.*: 2013; 135 16074
- [45] Huang P.-C. Gandeepan P. Cheng C.-H. *Chem. Commun.*: 2013; 49 8540
- [46] Huang J. Mao T. Zhu Q. *Eur. J. Org. Chem.*: 2014; 2878
- [47] Ilangoan A. Satish G. *Org. Lett.*: 2013; 15 5726
- [48] Młochowski J. Wójtowicz-Młochowska H. *Molecules*: 2015; 20 10205
- [49] Liu Y. Chen H. Hu X. Zhou W. Deng G.-J. *Eur. J. Org. Chem.*: 2013; 4229
- [50] Foley C. Shaw A. Hulme C. *Org. Lett.*: 2016; 18 4904
- [51] Rajeshkumar V. Chandrasekar S. Sekar G. *Org. Biomol. Chem.*: 2014; 12 8512
- [52] Ilangoan A. Satish G. *J. Org. Chem.*: 2014; 79 4984
- [53] Gao F.-F. Xue W.-J. Wang J.-G. Wu A.-X. *Tetrahedron*: 2014; 70 4331
- [54] Rogness D. C. Larock R. C. *J. Org. Chem.*: 2011; 76 4980
- [55] Tang B.-X. Song R.-J. Wu C.-Y. Liu Y. Zhou M.-B. Wei W.-T. Deng G.-B. Yin D.-L. Li J.-H. *J. Am. Chem. Soc.*: 2010; 132 8900
- [56] Yue Q. Wang Y. Hai L. Guo L. Yin H. Wu Y. *Synlett*: 2016; 27 1292
- [57] Zheng Y. Li J. Yu X. Lv S. Hai L. Wu Y. *Tetrahedron Lett.*: 2016; 57 39
- [58] Liu T. Yang H. Jiang Y. Fu H. *Adv. Synth. Catal.*: 2013; 355 1169
- [59] Gui Q. Dai F. Liu J. Chen P. Yang Z. Chen X. Tan Z. *Org. Biomol. Chem.*: 2014; 12 3349
- [60] Wang Y. Li W. Cheng X. Zhan Z. Ma X. Guo L. Jin H. Wu Y. *Tetrahedron*: 2016; 72 3193
- [61] Li J. Cheng X. Ma X. Lv G. Zhan Z. Guan M. Wu Y. *Synlett*: 2016; 27 2485
- [62] Jia X. Zhu Y. Yuan Y. Zhang X. Lu S. Zhang L. Luo L. *ACS Catal.*: 2016; 6 6033
- [63] Kuan S. H. C. Sun W. Wang L. Xia C. Tay M. G. Liu C. *Adv. Synth. Catal.*: 2017; 359 3469
- [64] Mason J. J. Janosik T. Bergman J. *Synthesis*: 2009; 3642
- [65] Zhan Z. Cheng X. Ma X. Li J. Hai L. Wu Y. *Tetrahedron*: 2015; 71 6928
- [66] Garg P. Jadhav S. D. Singh A. *Asian J. Org. Chem.*: 2017; 6 1019
- [67] Klein L. L. Tufano M. D. *Tetrahedron Lett.*: 2013; 54 1008
- [68] Ji H. Zhu Y. Shao Y. Liu J. Yuan Y. Jia X. *J. Org. Chem.*: 2017; 82 9859
- [69] Li W. Duan Z. Zhang X. Zhang H. Wang M. Jiang R. Zeng H. Liu C. Lei A. *Angew. Chem. Int. Ed.*: 2015; 54 1893

- [70] Laursen S. R. Jensen M. T. Lindhardt A. T. Jacobsen M. F. Skrydstrup T. *Eur. J. Org. Chem.*: 2016; 1881
- [71] Söderberg B. C. G. Gorugantula S. P. Howerton C. R. Petersen J. L. Dantale S. W. *Tetrahedron*: 2009; 65 7357
- [72] Maduli E. J. M. Edeson S. J. Swanson S. Procopiou P. A. Harrity J. P. A. *Org. Lett.*: 2015; 17 390
- [73] Satish G. Polu A. Ramar T. Ilangoan A. J. *Org. Chem.*: 2015; 80 5167
- [74] Huber S. M. Hennig A. Pühlhofer F. G. Weiss R. J. *Heterocycl. Chem.*: 2009; 46 421
- [75] Senadi G. C. Hu W.-P. Boominathan S. S. K. Wang J.-J. *Chem. Eur. J.*: 2015; 21 998
- [76] Sun J. Liu B. Xu B. *RSC Adv.*: 2013; 3 5824
- [77] Lollar C. T. Krenek K. M. Bruemmer K. J. Lippert A. R. *Org. Biomol. Chem.*: 2014; 12 406
- [78] Shrestha R. Lee G. J. Lee Y. R. *RSC Adv.*: 2016; 6 63782